

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 101744/PRS	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/IB 00/ 01719	International filing date (day/month/year) 07/07/2000	(Earliest) Priority Date (day/month/year) 09/07/1999
Applicant NOKIA NETWORKS OY et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1

☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB 00/01719

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04Q7/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04Q H04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 97 08911 A (HAEMAELAEINEN SEPPÖ ;NOKIA TELECOMMUNICATIONS OY (FI); HAEKKINEN H) 6 March 1997 (1997-03-06) page 4, line 10 - line 27 page 6, line 16 -page 7, line 25 ---	1
A	EP 0 324 508 A (TOKYO ELECTRIC POWER CO ;SUMITOMO ELECTRIC INDUSTRIES (JP)) 19 July 1989 (1989-07-19) page 3, line 17 - line 30 page 4, line 31 -page 5, line 2 -----	1

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

6 March 2001

Date of mailing of the international search report

13/03/2001

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel: (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Dionisi, M

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IB 00/01719

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9708911 A	06-03-1997	AU 712159 B	28-10-1999
		AU 3260595 A	19-03-1997
		EP 0872141 A	21-10-1998
		JP 11511601 T	05-10-1999
		NO 980874 A	27-04-1998
EP 0324508 A	19-07-1989	JP 1181339 A	19-07-1989
		JP 1893737 C	26-12-1994
		JP 6022345 B	23-03-1994
		DE 68922749 D	29-06-1995
		DE 68922749 T	28-09-1995
		DK 16089 A	15-07-1989
		NO 890135 A	17-07-1989
		US 4955082 A	04-09-1990

PATENT COOPERATION TREATY

10/030 352

PCT

From the INTERNATIONAL BUREAU

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

To:

SLINGSBY, Philip, Roy
Page White & Farrer
54 Doughty Street
London WC1N 2LS
ROYAUME-UNI

Date of mailing (day/month/year) 25 January 2002 (25.01.02)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference 101744/PRS	
International application No. PCT/IB00/01719	International filing date (day/month/year) 07 July 2000 (07.07.00)

1. The following indications appeared on record concerning:

☒ the applicant
 ☐ the inventor
 ☐ the agent
 ☐ the common representative

Name and Address

NOKIA NETWORKS OY
Keilalahdentie 4
FIN-02150 Espoo
Finland

State of Nationality

FI

State of Residence

FI

Telephone No.

Facsimile No.

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person
 ☒ the name
 ☐ the address
 ☐ the nationality
 ☐ the residence

Name and Address

NOKIA CORPORATION
Keilalahdentie 4
FIN-02150 Espoo
Finland

State of Nationality

FI

State of Residence

FI

Telephone No.

Facsimile No.

Teleprinter No.

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

<input checked="" type="checkbox"/> the receiving Office	<input type="checkbox"/> the designated Offices concerned
<input checked="" type="checkbox"/> the International Searching Authority	<input checked="" type="checkbox"/> the elected Offices concerned
<input type="checkbox"/> the International Preliminary Examining Authority	<input type="checkbox"/> other:

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Authorized officer

Catherine MONDON

Facsimile No.: (41-22) 740.14.35

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

10/030352

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
 US Department of Commerce
 United States Patent and Trademark
 Office, PCT
 2011 South Clark Place Room
 CP2/5C24
 Arlington, VA 22202
 ETATS-UNIS D'AMERIQUE
 in its capacity as elected Office

Date of mailing (day/month/year) 27 March 2001 (27.03.01)	
International application No. PCT/IB00/01719	Applicant's or agent's file reference 101744/PRS
International filing date (day/month/year) 07 July 2000 (07.07.00)	Priority date (day/month/year) 09 July 1999 (09.07.99)
Applicant KALLIOJARVI, Kari et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
 09 February 2001 (09.02.01)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
 34, chemin des Colombettes
 1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Lazar Joseph Panakal

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 101744/PRS	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/IB00/01719	International filing date (day/month/year) 07/07/2000	Priority date (day/month/year) 09/07/1999
International Patent Classification (IPC) or national classification and IPC H04Q7/38		
Applicant NOKIA NETWORKS OY et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.


2. This REPORT consists of a total of 6 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 09/02/2001	Date of completion of this report 30.08.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Harrysson, A Telephone No. +49 89 2399 7529



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/IB00/01719

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-11 as originally filed

Claims, No.:

1-14 as originally filed

Drawings, sheets:

1/2-2/2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/IB00/01719

☐ the drawings, sheets: .

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):
(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:
- ☐ the entire international application.
- ☒ claims Nos. 14.

because:

- ☒ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):
see separate sheet
- ☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):
- ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.
- ☐ no international search report has been established for the said claims Nos. .
2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:
- ☐ the written form has not been furnished or does not comply with the standard.
- ☐ the computer readable form has not been furnished or does not comply with the standard.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N) Yes: Claims 1-13

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/IB00/01719

	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-13
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-13
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

Concerning section III (non-establishment of opinion)

Dependent **Claim 14** is not allowable under Rule 6.2(a) PCT. Accordingly its novelty, inventiveness or industrial applicability has not been examined.

Concerning section V (reasoned statement under Article 35(2) PCT)

- 1) The following documents are cited:

D1: WO 97 08911 A (HAEMAELAEINEN SEPPO ;NOKIA
TELECOMMUNICATIONS OY (FI); HAEKKINEN H) 6 March 1997 (1997-03-
06)
D2: EP-A-0 324 508 (TOKYO ELECTRIC POWER CO ;SUMITOMO ELECTRIC
INDUSTRIES (JP)) 19 July 1989 (1989-07-19)

- 2) Independent **Claim 1** defines a telecommunication system comprising a plurality of transmitters capable of transmitting data in superframes, each superframe comprising a plurality of frames, and each frame comprising a plurality of slots.

The problem to be overcome by the current application is that when a mobile station is receiving signals from different transmitters at the same time, when one of the transmitters are very near, the other transmitted signals are difficult to receive (confer page 2 of the description).

The above problem is overcome in the current application by letting the transmitters transmit with reduced power for periods which commence at times defined by an assignment to each transmitter (confer remaining part of claim 1). Document D1, which is considered to be the closest prior art, discloses a similar telecommunication system. In D1, however, each transmitter transmit with reduced power only for periods explicitly requested by a subscriber terminal.

Thus the technique disclosed by the application is neither known, nor derivable from the prior art documents cited in the International Search Report. Claim 1 meets the requirements of Article 33(1)-(4) PCT with regard to novelty, inventive step and industrial applicability.

- 3) Dependent **claims 2-13** relate to further implementing details of the system defined by claim 1 to which they refer and are thus also meets the requirements of

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/IB00/01719

Article 33(1)-(4) PCT with regard to novelty, inventive step and industrial applicability.

Concerning section VII (defects in form or content)

- 1) The independent claims should have been drafted in the proper two-part form recommended by Rule 6.3(b) PCT, having a preamble that correctly reflects the nearest prior art, presumably that represented by document D1.
- 2) All the claims should have included reference signs in brackets where features shown in the drawings are referred to, Rule 6.2(b) PCT. This applies to both the preamble and characterising portion, PCT Guidelines IV-III-4.11.
- 3) In order to meet the requirements of Rule 5.1(a)(ii) PCT, the relevant prior art presumably document D1 should have been acknowledged by reference and briefly discussed in the introductory part of the description.



P.B.5818 - Patentlaan 2
2280 HV Rijswijk (ZH)
☎ (070) 3 40 20 40
TX 31651 epo nl
FAX (070) 3 40 30 16

Europäisches
Patentamt

Zweigstelle
in Den Haag

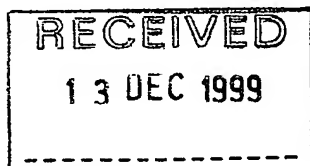
European
Patent Office

Branch at
The Hague

Office européen
des brevets

Département à
La Haye

PAGE WHITE & FARRER
Attn. Mr Philip Roy Slingsby
54 Doughty Street
LONDON WC1N 2LS
UNITED KINGDOM



Aktenzeichen/File No./No. du Dossier

RS 103658 GB

Datum/Date

10.12.99

Das Europäische Patentamt übermittelt hiermit den Standardrecherchenbericht zu dem unten bezeichneten Antrag; Kopien der im Recherchenbericht angeführten Schriften werden in der Anlage beigelegt.

The European Patent Office herewith transmits the Standard Search Report relating to the request indicated below; copies of the documents cited in the search report are enclosed.

L'Office Européen des Brevets à l'honneur de vous transmettre ci-joint le Rapport de Recherche concernant la demande désignée ci-dessous; des copies des documents cités sont jointes.

Zeichen und Datum des Antrages Applicant's reference and date Références et date de la demande	92084/PRS
Dokument, Gegenstand der Recherche Document subject of the search Objet de la recherche	GBA 9916220
Einreichungstag Filing date Date de dépôt	09/07/1999
Beanspruchte Priorität Priority claimed Priorité revendiquée	

OFFICE EUROPÉEN DES BREVETS
Pour le Vice-Président,

10.12.99



European Patent
Office

STANDARD SEARCH REPORT

File
RS 103658

DOCUMENTS CONSIDERED TO BE RELEVANT				
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim		
A	WO 97 08911 A (HAEMAELAEINEN SEPP0 ;NOKIA TELECOMMUNICATIONS OY (FI); HAEKKINEN H) 6 March 1997 (1997-03-06) * page 4, line 10 - line 27 * * page 6, line 16 - page 7, line 25 * ---	1		
A	EP 0 324 508 A (TOKYO ELECTRIC POWER CO ;SUMITOMO ELECTRIC INDUSTRIES (JP)) 19 July 1989 (1989-07-19) * page 3, line 17 - line 30 * * page 4, line 31 - page 5, line 2 * -----	1		
The present search report has been drawn up for all claims				
Date of completion of the search 8 December 1999		Examiner Dionisi, M		
<table border="0"><tr><td>CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</td><td>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document</td></tr></table>			CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document	T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document	T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document			

TECHNICAL FIELDS
SEARCHED (Int.CL.6)

H04Q
H04B

ANNEX TO THE STANDARD SEARCH REPORT NO.

RS 103658

This annex lists the patent family members relating to the patent documents cited in the above-mentioned search report.
 The members are as contained in the European Patent Office EDP file on
 The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

08-12-1999

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9708911 A	06-03-1997	AU 3260595 A	19-03-1997
		EP 0872141 A	21-10-1998
		NO 980874 A	27-04-1998
EP 0324508 A	19-07-1989	JP 1181339 A	19-07-1989
		JP 1893737 C	26-12-1994
		JP 6022345 B	23-03-1994
		DE 68922749 D	29-06-1995
		DE 68922749 T	28-09-1995
		DK 16089 A	15-07-1989
		NO 890135 A	17-07-1989
		US 4955082 A	04-09-1990

The demand must be filed directly with the competent International Preliminary Examining Authority if two or more Authorities are competent, with the one chosen by the applicant. The name or two-letter code of that Authority may be indicated by the applicant on the line below:

IPEA/ EP

PCT

CHAPTER II

DEMAND

under Article 31 of the Patent Cooperation Treaty:
The undersigned requests that the international application specified below be the subject of international preliminary examination according to the Patent Cooperation Treaty and hereby elects all eligible States (except where otherwise indicated).

For International Preliminary Examining Authority use only

Identification of IPEA		Date of receipt of DEMAND
Box No. I IDENTIFICATION OF THE INTERNATIONAL APPLICATION		Applicant's or agent's file reference 101744/PRS
International application No. PCT/IB00/01719	International filing date (day/month/year) 07 July 2000 (07.07.00)	(Earliest) Priority date (day/month/year) 09 July 1999 (09.07.99)
Title of invention PLACEMENT OF IDLE PERIODS		
Box No. II APPLICANT(S)		
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) NOKIA NETWORKS OY Keilalahdentie 4 FIN-02150 Espoo Finland		Telephone No.: Facsimile No.: Teleprinter No.:
State (that is, country) of nationality: Finland (FI)	State (that is, country) of residence: Finland (FI)	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) KALLIOJARVI; Kari Nokia Networks Oy Keilalahdentie 4 FIN-02150 Espoo Finland		
State (that is, country) of nationality: Finland (FI)	State (that is, country) of residence: Finland (FI)	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) MODONESI; Isabella Nokia Networks Oy Keilalahdentie 4 FIN-02150 Espoo Finland		
State (that is, country) of nationality: Finland (FI)	State (that is, country) of residence: Finland (FI)	
<input type="checkbox"/> Further applicants are indicated on a continuation sheet.		

Box No. III AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCEThe following person is ☒ agent ☐ common representativeand ☒ has been appointed earlier and represents the applicant(s) also for international preliminary examination.☐ is hereby appointed and any earlier appointment of (an) agent(s)/common representative is hereby revoked.☐ is hereby appointed, specifically for the procedure before the International Preliminary Examining Authority, in addition to the agent(s)/common representative appointed earlier.Name and address: *(Family name followed by given name; for a legal entity, full official designation.
The address must include postal code and name of country.)*SLINGSBY; Philip Roy
PAGE WHITE & FARRER
54 Doughty Street
London WC1N 2LS
United Kingdom

Telephone No.:

020 7831-7929

Facsimile No.:

020 7831-8040

Teleprinter No.:

8955681

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.**Box No. IV BASIS FOR INTERNATIONAL PRELIMINARY EXAMINATION****Statement concerning amendments: ***

1. The applicant wishes the international preliminary examination to start on the basis of:

☒ the international application as originally filed

the description

☒

as originally filed

☐

as amended under Article 34

the claims

☒

as originally filed

☐

as amended under Article 19 (together with any accompanying statement)

☐

as amended under Article 34

the drawings

☒

as originally filed

☐

as amended under Article 34

2. ☐ The applicant wishes any amendment to the claims under Article 19 to be considered as reversed.3. ☐ The applicant wishes the start of the international preliminary examination to be postponed until the expiration of 20 months from the priority date unless the International Preliminary Examining Authority receives a copy of any amendments made under Article 19 or a notice from the applicant that he does not wish to make such amendments (Rule 69.1(d)). *(This check-box may be marked only where the time limit under Article 19 has not yet expired.)*

* Where no check-box is marked, international preliminary examination will start on the basis of the international application as originally filed or, where a copy of amendments to the claims under Article 19 and/or amendments of the international application under Article 34 are received by the International Preliminary Examining Authority before it has begun to draw up a written opinion or the international preliminary examination report, as so amended.

Language for the purposes of international preliminary examination: English

☒

which is the language in which the international application was filed.

☐

which is the language of a translation furnished for the purposes of international search.

☐

which is the language of publication of the international application.

☐

which is the language of the translation (to be) furnished for the purposes of international preliminary examination.

Box No. V ELECTION OF STATESThe applicant hereby elects all eligible States *(that is, all States which have been designated and which are bound by Chapter II of the PCT)*

excluding the following States which the applicant wishes not to elect:

Box No. VI CHECK LIST

The demand is accompanied by the following elements, in the language referred to in Box No. IV, for the purposes of international preliminary examination:

- | | | |
|--|---|----------|
| 1. translation of international application | : | sheets |
| 2. amendments under Article 34 | : | sheets |
| 3. copy (or, where required, translation) of amendments under Article 19 | : | sheets |
| 4. copy (or, where required, translation) of statement under Article 19 | : | sheets |
| 5. letter | : | 1 sheets |
| 6. other (<i>specify</i>) | : | sheets |

For International Preliminary Examining Authority use only

received not received

<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

The demand is also accompanied by the item(s) marked below:

- | | |
|--|---|
| 1. <input checked="" type="checkbox"/> fee calculation sheet | 4. <input type="checkbox"/> statement explaining lack of signature |
| 2. <input type="checkbox"/> separate signed power of attorney | 5. <input type="checkbox"/> nucleotide and or amino acid sequence listing in computer readable form |
| 3. <input type="checkbox"/> copy of general power of attorney, reference number, if any: | 6. <input type="checkbox"/> other (<i>specify</i>): |

Box No. VII SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the demand).

SLINGSBY; Philip Roy - Authorised Representative

For International Preliminary Examining Authority use only

1. Date of actual receipt of DEMAND:

2. Adjusted date of receipt of demand due to CORRECTIONS under Rule 60.1(b):

3. ☐ The date of receipt of the demand is AFTER the expiration of 19 months from the priority date and item 4 or 5, below, does not apply. ☐ The applicant has been informed accordingly.

4. ☐ The date of receipt of the demand is WITHIN the period of 19 months from the priority date as extended by virtue of Rule 80.5.

5. ☐ Although the date of receipt of the demand is after the expiration of 19 months from the priority date, the delay in arrival is EXCUSED pursuant to Rule 82.

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Demand received from IPEA on:

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference
(if desired) (12 characters maximum)

101744/PRS

Box No. I TITLE OF INVENTION

PLACEMENT OF IDLE SLOTS

Box No. II APPLICANT

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

NOKIA NETWORKS OY
Keilalahdentie 4
FIN-02150 Espoo
Finland

☐ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State (that is, country) of nationality:

Finland (FI)

State (that is, country) of residence:

Finland (FI)

This person is applicant
for the purposes of:

☐ all designated
States

☒ all designated States except
the United States of America

☐ the United States
of America only

☐ the States indicated in
the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

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Nokia Networks Oy
Keilalahdentie 4
FIN-02150 Espoo
Finland

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only (If this check-box
is marked, do not fill in below.)

State (that is, country) of nationality:

Finland (FI)

State (that is, country) of residence:

Finland (FI)

This person is applicant
for the purposes of:

☐ all designated
States

☐ all designated States except
the United States of America

☒ the United States
of America only

☐ the States indicated in
the Supplemental Box

☒ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf
of the applicant(s) before the competent International Authorities as:

☒ agent

☐ common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

SLINGSBY; Philip Roy
Page White & Farrer
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United Kingdom

Telephone No.

020 7831 7929

Facsimile No.

020 2831 8040

Teleprinter No.

8955681

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Continuation of Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

If none of the following sub-boxes is used, this sheet should not be included in the request.

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

MODONESI; Isabella
Nokia Networks Oy
Keilalahdentie 4
FIN-02150 Espoo
Finland

This person is:

- ☐ applicant only
☒ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:
Finland (FI)

State (that is, country) of residence:
Finland (FI)

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

- ☐ applicant only
☐ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

- ☐ applicant only
☐ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

- ☐ applicant only
☐ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on another continuation sheet.

Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

Regional Patent

- ☒ AP ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SL Sierra Leone, SZ Swaziland, TZ United Republic of Tanzania, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ EA Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ EP European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ OA OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

National Patent (if other kind of protection or treatment desired, specify on dotted line):

- | | |
|--|---|
| <input checked="" type="checkbox"/> AE United Arab Emirates | <input checked="" type="checkbox"/> LR Liberia |
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| <input checked="" type="checkbox"/> AM Armenia | <input checked="" type="checkbox"/> LT Lithuania |
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| <input checked="" type="checkbox"/> AU Australia | <input checked="" type="checkbox"/> LV Latvia |
| <input checked="" type="checkbox"/> AZ Azerbaijan | <input checked="" type="checkbox"/> MA Morocco |
| <input checked="" type="checkbox"/> BA Bosnia and Herzegovina | <input checked="" type="checkbox"/> MD Republic of Moldova |
| <input checked="" type="checkbox"/> BB Barbados | <input checked="" type="checkbox"/> MG Madagascar |
| <input checked="" type="checkbox"/> BG Bulgaria | <input checked="" type="checkbox"/> MK The former Yugoslav Republic of Macedonia |
| <input checked="" type="checkbox"/> BR Brazil | |
| <input checked="" type="checkbox"/> BY Belarus | <input checked="" type="checkbox"/> MN Mongolia |
| <input checked="" type="checkbox"/> CA Canada | <input checked="" type="checkbox"/> MW Malawi |
| <input checked="" type="checkbox"/> CH and LI Switzerland and Liechtenstein | <input checked="" type="checkbox"/> MX Mexico |
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| <input checked="" type="checkbox"/> DE Germany | <input checked="" type="checkbox"/> RO Romania |
| <input checked="" type="checkbox"/> DK Denmark | <input checked="" type="checkbox"/> RU Russian Federation |
| <input checked="" type="checkbox"/> DM Dominica | <input checked="" type="checkbox"/> SD Sudan |
| <input checked="" type="checkbox"/> EE Estonia | <input checked="" type="checkbox"/> SE Sweden |
| <input checked="" type="checkbox"/> ES Spain | <input checked="" type="checkbox"/> SG Singapore |
| <input checked="" type="checkbox"/> FI Finland | <input checked="" type="checkbox"/> SI Slovenia |
| <input checked="" type="checkbox"/> GB United Kingdom | <input checked="" type="checkbox"/> SK Slovakia |
| <input checked="" type="checkbox"/> GD Grenada | <input checked="" type="checkbox"/> SL Sierra Leone |
| <input checked="" type="checkbox"/> GE Georgia | <input checked="" type="checkbox"/> TJ Tajikistan |
| <input checked="" type="checkbox"/> GH Ghana | <input checked="" type="checkbox"/> TM Turkmenistan |
| <input checked="" type="checkbox"/> GM Gambia | <input checked="" type="checkbox"/> TR Turkey |
| <input checked="" type="checkbox"/> HR Croatia | <input checked="" type="checkbox"/> TT Trinidad and Tobago |
| <input checked="" type="checkbox"/> HU Hungary | <input checked="" type="checkbox"/> TZ United Republic of Tanzania |
| <input checked="" type="checkbox"/> ID Indonesia | <input checked="" type="checkbox"/> UA Ukraine |
| <input checked="" type="checkbox"/> IL Israel | <input checked="" type="checkbox"/> UG Uganda |
| <input checked="" type="checkbox"/> IN India | <input checked="" type="checkbox"/> US United States of America |
| <input checked="" type="checkbox"/> IS Iceland | |
| <input checked="" type="checkbox"/> JP Japan | <input checked="" type="checkbox"/> UZ Uzbekistan |
| <input checked="" type="checkbox"/> KE Kenya | <input checked="" type="checkbox"/> VN Viet Nam |
| <input checked="" type="checkbox"/> KG Kyrgyzstan | <input checked="" type="checkbox"/> YU Yugoslavia |
| <input checked="" type="checkbox"/> KP Democratic People's Republic of Korea | <input checked="" type="checkbox"/> ZA South Africa |
| | <input checked="" type="checkbox"/> ZW Zimbabwe |
| <input checked="" type="checkbox"/> KR Republic of Korea | Check-boxes reserved for designating States which have become party to the PCT after issuance of this sheet |
| <input checked="" type="checkbox"/> KZ Kazakhstan | <input checked="" type="checkbox"/> ..Antigua and Barbuda |
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Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation (including fees) must reach the receiving Office within the 15-month time limit.)

Supplemental Box *If the Supplemental Box is not used, this sheet should not be included in the request.*

1. If, in any of the Boxes, the space is insufficient to furnish all the information: in such case, write "Continuation of Box No. ..." (indicate the number of the Box) and furnish the information in the same manner as required according to the captions of the Box in which the space was insufficient, in particular:

- (i) if more than two persons are involved as applicants and/or inventors and no "continuation sheet" is available: in such case, write "Continuation of Box No. III" and indicate for each additional person the same type of information as required in Box No. III. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below;
- (ii) if, in Box No. II or in any of the sub-boxes of Box No. III, the indication "the States indicated in the Supplemental Box" is checked: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the applicant(s) involved and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is applicant;
- (iii) if, in Box No. II or in any of the sub-boxes of Box No. III, the inventor or the inventor/applicant is not inventor for the purposes of all designated States or for the purposes of the United States of America: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the inventor(s) and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is inventor;
- (iv) if, in addition to the agent(s) indicated in Box No. IV, there are further agents: in such case, write "Continuation of Box No. IV" and indicate for each further agent the same type of information as required in Box No. IV;
- (v) if, in Box No. V, the name of any State (or OAPI) is accompanied by the indication "patent of addition," or "certificate of addition," or if, in Box No. V, the name of the United States of America is accompanied by an indication "continuation" or "continuation-in-part": in such case, write "Continuation of Box No. V" and the name of each State involved (or OAPI), and after the name of each such State (or OAPI), the number of the parent title or parent application and the date of grant of the parent title or filing of the parent application;
- (vi) if, in Box No. VI, there are more than three earlier applications whose priority is claimed: in such case, write "Continuation of Box No. VI" and indicate for each additional earlier application the same type of information as required in Box No. VI;
- (vii) if, in Box No. VI, the earlier application is an ARIPO application: in such case, write "Continuation of Box No. VI", specify the number of the item corresponding to that earlier application and indicate at least one country party to the Paris Convention for the Protection of Industrial Property or one Member of the World Trade Organization for which that earlier application was filed.

2. If, with regard to the precautionary designation statement contained in Box No. V, the applicant wishes to exclude any State(s) from the scope of that statement: in such case, write "Designation(s) excluded from precautionary designation statement" and indicate the name or two-letter code of each State so excluded.

3. If the applicant claims, in respect of any designated Office, the benefits of provisions of the national law concerning non-prejudicial disclosures or exceptions to lack of novelty: in such case, write "Statement concerning non-prejudicial disclosures or exceptions to lack of novelty" and furnish that statement below.

Continuation of Box No. IV
Agents continued

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RICHARDS; David John (GB)
JENKINS; Peter David (GB)
DRIVER; Virginia Rozanne (GB)
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STYLE; Kelda Camilla Karen (GB)
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Fax: 020 7831 8040

Telex: 8955681

Box No. VI PRIORITY CLAIM		<input type="checkbox"/> Further priority claims are indicated in the Supplemental Box.		
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		national application: country	regional application: regional Office	international application: receiving Office
item (1) 9 July 1999 (09.07.99)	9916220.8	GB		
item (2)				
item (3)				

☐ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s):

* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.

Box No. VII INTERNATIONAL SEARCHING AUTHORITY			
Choice of International Searching Authority (ISA) (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):	Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority):		
ISA/ EP	Date (day/month/year)	Number	Country (or regional Office)
	10 December 1999	RS 103658	GB

Box No. VIII CHECK LIST; LANGUAGE OF FILING	
This international application contains the following number of sheets: request : 5 description (excluding sequence listing part) : 11 claims : 2 abstract : 1 drawings : 2 sequence listing part of description : Total number of sheets : 21	This international application is accompanied by the item(s) marked below: 1. <input type="checkbox"/> fee calculation sheet 2. <input type="checkbox"/> separate signed power of attorney 3. <input checked="" type="checkbox"/> copy of general power of attorney; reference number, if any: GBP00/0066 4. <input type="checkbox"/> statement explaining lack of signature 5. <input type="checkbox"/> priority document(s) identified in Box No. VI as item(s): 6. <input type="checkbox"/> translation of international application into (language): 7. <input type="checkbox"/> separate indications concerning deposited microorganism or other biological material 8. <input type="checkbox"/> nucleotide and/or amino acid sequence listing in computer readable form 9. <input type="checkbox"/> other (specify):
Figure of the drawings which should accompany the abstract: 1	Language of filing of the international application: English

Box No. IX SIGNATURE OF APPLICANT OR AGENT	
<small>Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).</small>	
SLINGSBY; Philip Roy - Authorised Representative	

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1. Date of actual receipt of the purported international application: 3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application: 4. Date of timely receipt of the required corrections under PCT Article 11(2): 5. International Searching Authority (if two or more are competent): ISA/	2. Drawings: <input type="checkbox"/> received: <input type="checkbox"/> not received: 6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid.

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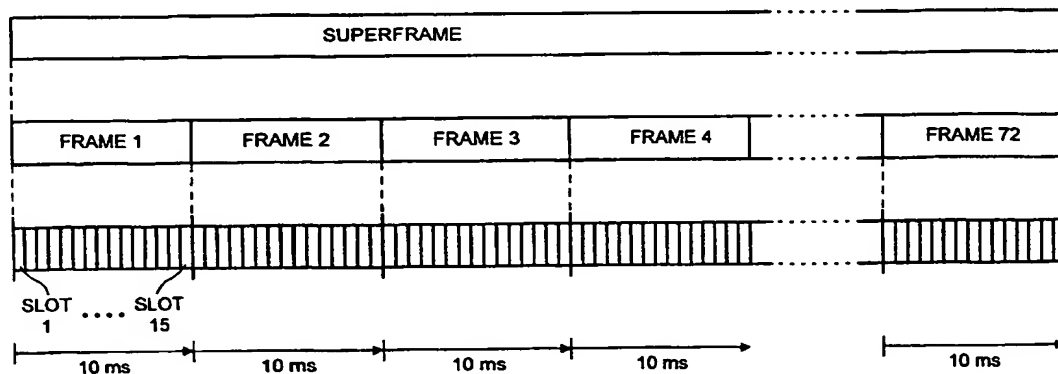
(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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International Bureau(43) International Publication Date
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- (51) International Patent Classification⁷: **H04Q**
- (21) International Application Number: **PCT/IB00/01719**
- (22) International Filing Date: **7 July 2000 (07.07.2000)**
- (25) Filing Language: **English**
- (26) Publication Language: **English**
- (30) Priority Data:
9916220.8 **9 July 1999 (09.07.1999)** **GB**
- (71) Applicant (for all designated States except US): **NOKIA NETWORKS OY** [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **KALLIOJARVI, Kari** [FI/FI]; Nokia Networks Oy, Keilalahdentie 4, FIN-02150 Espoo (FI). **MODONESI, Isabella** [FI/FI]; Nokia Networks Oy, Keilalahdentie 4, FIN-02150 Espoo (FI).
- (54) Title: **PLACEMENT OF IDLE PERIODS**
- (84) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- Published:**
— Without international search report and to be republished upon receipt of that report.
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.



(57) Abstract: A telecommunications system comprising: a plurality of transmitters capable of transmitting data in superframes, each superframe comprising a plurality of frames, and each frame comprising a plurality of slots; the transmitters being arranged in groups, each group comprising a number of base stations, each group of base stations being assigned one or more slot numbers which are different from those of other groups and each of the transmitters of each group being assigned a different frame number, each transmitter being arranged to operate at reduced transmission power for a period commencing in the allocated slot or slots assigned to its group in the frame assigned to it.

PLACEMENT OF IDLE PERIODS

Description

The present invention relates to a telecommunications system and in particular to the arrangement of transmitters to potentially allow the transmissions of individual transmitters to be more easily distinguished.

It is known to be desirable in telecommunications systems to provide positioning methods for determining the geographical location of users within the system. This is useful for many reasons, such as emergency location, area-based billing, fleet management for trucking companies and other similar location based value-added services.

One way of mobile phone positioning is by means of a triangulation system, in which the location of a particular mobile phone is calculated using control signals from at least the three base stations closest to it. This system uses the assumption that the distance of the phone from a base station is proportional to the strength of the signal which the base station receives from it, or the time taken for the signal to travel between the phone and the respective base station. Thus the position of the phone can be determined by comparing the relative strengths or travel times of received signals between the three base stations and thus assessing the distance of the user from each base station. The actual location of the user is then obtainable geometrically since the location of the base stations is known and fixed.

There are a number of different methods of making the measurements for performing the above calculation, depending on the mobile system. In a Code Division Multiple Access (CDMA) system, the method which provides the greatest accuracy as well as having other advantages is a time-based method. This method is a downlink method in which a user's mobile phone measures the differences in the time of arrival (TOA)

of signals from surrounding base stations in order to determine the relative distances between the user and each base station.

One particular problem which a time-based method is capable of overcoming is that of "hearability". This problem occurs when the user's mobile phone is much closer to one of the base stations being used for positioning purposes than other surrounding base stations. In this situation, the signal between the user and the close station is so strong, that it is difficult to transmit and receive signals between the user and the other surrounding base stations. This problem occurs particularly in a CDMA system, because all base stations typically transmit at the same carrier frequency.

In the proposed wideband CDMA system (W-CDMA), which is suggested for the universal mobile telecommunications system (UMTS) standard there are proposed to be three types of control channel. The first type is broadcast control channels (BCH) which are to be used, for example, for transmitting frequency and frame synchronisation information. The second type is common control channels (CCCH) which are to be used for network access, for example paging services. These first two types are common to all mobile users. The third type is dedicated control channels which are to be allocated to individual users. These include channels used for handover and user registration. It is likely that measurements for the purpose of mobile phone location will use an existing BCH. Signals are transmitted in blocks called frames, transmitted over each channel. The order of transmission of frames from the different data streams is suitably selected for greatest efficiency. Since this is not a time division system, the problem of hearability can in principle be overcome by transmitting at reduced power or ceasing transmission from the closest base station for short periods of time. Such a time period is known as an idle period. It allows the remaining base stations being used for positioning purposes to communicate with the mobile phone, thus providing the ability to locate the user. This should not affect the transmission quality significantly since during such a time period, a user's mobile phone will often receive signals from its other nearby base stations if the mobile phone is in a soft handover (macrodiversity) situation.

In order to allow positioning to occur during idle periods it would be desirable to allocate idle periods such that nearby base stations do not have idle periods at the same time. This is so that during an idle period, a mobile phone will still be able to pick up signals from other nearby base stations and therefore the positioning of the mobile can continue using signals from other base stations.

According to the present invention there is provided a telecommunications system comprising : a plurality of transmitters capable of transmitting data in superframes, each superframe comprising a plurality of frames, and each frame comprising a plurality of slots; the transmitters being arranged in groups, each group comprising a number of base stations, each group of base stations being assigned one or more slot numbers which are different from those of other groups and each of the transmitters of each group being assigned a different frame number, each transmitter being arranged to operate at reduced transmission power for a period commencing in the allocated slot or slots assigned to its group in the frame assigned to it.

An embodiment of the present invention will now be described by way of example with reference to the accompanying drawings in which :

Figure 1 is a schematic representation of a superframe divided into frames, and the associated time slots; and

Figure 2 is a representation of a two-layer re-use system in one RNC coverage area.

This embodiment relates to a mobile telecommunications system using the proposed W-CDMA standard, in which the network is asynchronous. The following description focuses on control of base stations by radio network controllers (RNCs) and transmission between base stations and mobile telephones.

In the proposed W-CDMA system, a mobile station can communicate by radio with one or more base stations. Each base station is controlled by an RNC, each of

which can control a number of base stations. The RNCs are connected to one or more core network entities which are connected to other telecommunications networks, and by means of which telecommunications services can be provided to the mobile station.

Under normal conditions a base station (BS) transmits signals carrying a variety of data and control information in the form of frames. In this embodiment, there are 72 frames in one superframe and each frame is 10ms long. Thus each superframe is 0.72 seconds long. This is indicated in figure 1. Figure 1 shows a superframe (labelled SUPERFRAME) divided into 72 frames, labelled FRAME 1, FRAME 2, FRAME 3 ... FRAME 72. The number and duration of frames in this embodiment are an example, but there could be a different number of frames in a superframe and the frames could be of a duration different from 10ms. Signals transmitted by a base station may be used for determining the locations of mobile phones .

Figure 1 also shows that in terms of time, each frame is divided into 15 slots, each slot having a length in time of one fifteenth of 10ms, which is approximately 0.667ms. These slots are labelled for illustration for FRAME 1 as SLOT 1.....SLOT 15. Each slot represents one measurement period for positioning purposes, that is to say signal measurements for positioning purposes can be made by the base station approximately every 0.667ms.

In this embodiment, idle periods are scheduled to occur for the duration of one (approximately) 0.667ms slot. Thus when an idle period is scheduled for a particular base station that base station will either cease transmission or transmit at much reduced power for a (approximately) 0.6667ms slot. During this period any mobile phones located near to such a particular base station will continue to receive signals from other base stations near to them, so that positioning of such mobile phones can continue using these other signals. Indeed the reduced signal from the particular base station allows these other signals to be received with much greater accuracy by the mobile phones.

In order for it to be assured that mobile phones can continue to receive signals from other base stations during the idle period of one base station, it is necessary to coordinate the occurrence of idle periods of nearby base stations in the mobile network. The assignment of idle periods to base stations is carried out by a radio network controller (RNC) according to a predetermined strategy.

Figure 2 shows how the idle periods are assigned in the present embodiment. This figure shows a part of one RNC coverage area, in which all the base stations are controlled by one RNC. This RNC coverage area can be considered to continue in all directions beyond the part shown and furthermore the telecommunications system can be considered to extend beyond that into other RNC coverage areas, but for the purposes of describing this embodiment, the description of the allocation of idle periods is based on consideration of the seven groups of base stations shown in figure 2. The number seven here is used as an example in this embodiment, but a different number could be chosen. The areas covered by the radio cells of the base stations of each of the seven groups are shown by different shadings and are labelled A-G. In the arrangement shown in the figure, group A is the central group which is surrounded by the other six groups B-G. Group B is situated to the top right of group A and groups C-G are situated in clockwise progression from group B. There are no gaps between the groups. In practice the groups may overlap, or there may be some gap in coverage areas between the groups.

Each of the seven groups A-G contains seven base stations, labelled 1-7. For ease of drawing, each base station is shown as covering a hexagonal area so that there are no uncovered areas. Referring to figure 2, within the hexagonal area of a particular base station, it is assumed that a mobile phone will receive the strongest signal from that base station. In practice the areas would be less uniform, but this would not affect the working of the embodiment significantly. In practice the area covered by a base station depends on factors including intervening features, such as buildings, and the directionality of the base station's antenna. In practice the

coverage areas of adjacent base stations may abut, overlap or be spaced somewhat apart.

It should be understood that any sub-base stations or sectors within the hexagonal area of a base station, for example sub-base stations within an office site, can be synchronised with the base station and allocated idle periods at the same time. This is because positioning of a mobile may be assumed to involve measurements between different base station sites, not between sub-base stations within a site.

In the system of Figure 2 a two-level reuse pattern is used to allocate idle periods. In order to illustrate this concept, the first level reuse pattern will be described with reference to group A.

Group A contains seven base stations, which are a central one, BS1, surrounded by six others, arranged such that BS2 is directly below BS1 and BS3-7 are situated in clockwise progression from BS2. Thus the shape of the area covered by each group is defined by a central hexagon surrounded by six further hexagons joined along adjacent edges. There are no gaps between the areas. It would be possible to number the base stations differently or to use a different number of base stations within a group or to use a different shape to depict the coverage area of a base station. The numbering and arrangement of cells is purely illustrative.

The purpose of the first level of reuse is to ensure that no two of BS1-7 are allocated an idle period at the same time. Therefore the idle periods are allocated in sequence (although other allocation schemes could be used to achieve the same result). This is shown in Table 1 below, for one superframe.

BS number	Assigned frames for idle period
BS1	1 8 15 22 29 36 43 50 57 64
BS2	2 9 16 23 30 37 44 51 58

	65
BS3	3 10 17 24 31 38 45 52 59 66
BS4	4 11 18 25 32 39 46 53 60 67
BS5	5 12 19 26 33 40 47 54 61 68
BS6	6 13 20 27 34 41 48 55 62 69
BS7	7 14 21 28 35 42 49 56 63 70

Table 1 : First level reuse frame allocation for Group A

Since there are seven base stations, the reuse factor in this case is chosen to be 7. This means that the first seven frames of the superframe are assigned sequentially to BS1-7 and then the next seven are similarly assigned (frames 8-14) followed by the next seven (frames 15-21) and so on, until 70 frames have been allocated. Since the superframe consists of 72 frames, frames 71 and 72 are not allocated. Alternatively, frames 71 and 72 could be allocated to any base station. Upon completion of this superframe, the pattern is repeated for the subsequent superframes.

Such an assignment of idle periods means that one idle period is equal to the measurement interval. This is because in this embodiment an idle period occurs throughout one (approximately) 0.667ms time slot, as explained above. The measurement interval is decided according to the required quality of data transmission. The period of (approximately) 0.667ms is in the proposed W-CDMA standard but other periods are compatible with the present invention. In the W-

CDMA standard the performance penalty due to the occurrence of an idle period over this time period is likely to be acceptably small.

Table 1 depicts a uniform assignment of frames having idle periods. An alternative would be to vary the allocation of idle periods so that some base stations were allocated more idle periods than others. This might be useful depending on the number of mobile phones in the area of some base stations at a particular time.

It would also be possible to vary the pattern of allocation between superframes, but this might well add unnecessary complications.

Having considered the first level reuse pattern for group A, referring to figure 2 it can be seen that the other groups B-G are formed from similar arrangements of hexagons defining similar base station coverage areas. Each group is arranged to have a central base station BS1 surrounded by the other six base stations BS2-7, BS2 being directly below BS1 and BS3-7 being situated in clockwise progression from BS2. This means that there is no occurrence of a same-numbered base station from one group being situated adjacent to a same-numbered base station of another group. This means that in this embodiment, each of the groups uses the same first-level reuse pattern as that described above for group A. Therefore it can be arranged that adjacent base stations of different groups will always be assigned different frame numbers for idle periods. There is some uncertainty that this will be the case due to the asynchronicity of the network.

It would be possible to vary the pattern of frame allocation between groups, for example to be non-uniform.

To summarise, the first reuse level defines the frame numbers of the frames containing the idle periods within a superframe for each base station.

The second level reuse pattern will now be described with reference to the entire area depicted in figure 2. The purpose of the second level reuse allocation is to define the location of the start of the idle period within a frame, the frame having been allocated according to the first reuse level. In this embodiment, one slot is allocated for an idle period, but it would be possible to allocate one or more adjacent time slots within a frame during which the base station will have an idle period. Since there are 15 slots within a frame in this embodiment, the maximum second level re-use factor is 15. In general, the maximum reuse factor is given by the following expression :

Integer part of [number of slots in a frame / length of idle period in slots]

The second level reuse pattern is allocated according to groups. This means that all seven base stations in any one group are allocated the same slot number within any given frame. In fact, just odd slot numbers are allocated, as shown in table 2 below.

Group	Slot number
A	1st slot
B	11th slot
C	13th slot
D	3rd slot
E	5th slot
F	7th slot
G	9th slot

Table 2 : Second level reuse slot allocation in one frame

The table indicates that central group A is allocated the first slot of every frame and odd-numbered slots 3-13 are allocated to the remaining groups in a clockwise sequence from group D round to group B.

Such a slot allocation means that for any given group, all seven base stations within that group use the same slot number within their allocated frame. By virtue of the first level frame reuse allocation, namely that different base stations within a group are allocated different frames, the risk of allocated idle periods of adjacent base stations within a group occurring at the same time is small. The risk is not zero, due to the asynchronicity between base stations. Furthermore, since adjacent base stations of different groups are allocated both different frame numbers and slot numbers, the risk of their idle periods occurring at the same time is similarly small.

In practical terms, since the separation in time between consecutive idle periods is a constant, measurement delays which happen as a result of an idle period do not depend on the time at which a mobile positioning update is requested. Hence the effect on service quality is likely to be small.

Thus, in summary, the base stations are split into groups of adjacent or at least nearby base stations which may or may not be controlled by a single RNC. The base stations in each group are each allocated selected frames of the recurring superframes of the transmission structure such that in each group no more than one base station is allocated any frame. Between adjacent or at least nearby groups an allocation of idle periods as selected slots in the recurring frames of the transmission structure is made such that no more than one group in a locality is allocated any slot. By this means the likelihood of any more than one base station in a locality having an idle period at any time is greatly reduced. Hence, the opportunity for a mobile station to reliably measure the signals transmitted from the base stations can be increased and the accuracy of positioning measurements can potentially be improved.

It will be appreciated that the embodiment would be implemented in a similar way in the surrounding RNC coverage areas, such that the risk of idle periods of base stations adjacent to one another but falling within a different RNC coverage area occurring at the same time, is also similarly small.

According to this embodiment, in any one frame each base station is allocated just one idle slot out of the 15 available, meaning that each idle period lasts for a duration of one slot, or approximately 0.667ms. It would be possible to vary the idle period duration by allocating other multiples of slots to a base station, for example half a slot, two or more slots or even a whole frame. It would also be possible, for example, to allocate more than two slots to some base stations and none to others depending on requirements, thus varying the duration of each base station's idle period. It would also be possible to not allocate any slots for some frames and hence reduce the total number of idle periods within a superframe and thus increase the service quality.

The embodiment described is concerned with minimising the chance of idle periods of adjacent base stations from coinciding. Since the allocation of frames and slot numbers is flexible, it would be possible to number the base stations differently or locate the groups differently should it be desired to use different criteria for optimum idle period allocation. The described idle period allocation would also work across RNC coverage areas.

The described embodiment is for an asynchronous network. It allows the probability of idle periods of nearby base stations overlapping to be small. The embodiment and its mentioned alternatives would work equally well with a synchronous network and in that case would in fact guarantee no overlap.

CLAIMS

1. A telecommunications system comprising :
a plurality of transmitters capable of transmitting data in superframes, each superframe comprising a plurality of frames, and each frame comprising a plurality of slots;
the transmitters being arranged in groups, each group comprising a number of base stations, each group of base stations being assigned one or more slot numbers which are different from those of other groups and each of the transmitters of each group being assigned a different frame number, each transmitter being arranged to operate at reduced transmission power for a period commencing in the allocated slot or slots assigned to its group in the frame assigned to it.
2. A telecommunications system according to claim 1, wherein each group comprises a set of nearby transmitters.
3. A telecommunications system according to any preceding claim, wherein adjacent base stations within a group are assigned different frame numbers.
4. A telecommunications system according to any preceding claim, wherein adjacent base stations belonging to different groups are assigned different frame numbers.
5. A telecommunications system according to any preceding claim, wherein all the base stations within one group are assigned the same slot number or numbers.
6. A telecommunications system according to any preceding claim, wherein each frame comprises 15 slots and geographically adjacent groups are assigned slots which are spaced apart by at least one slot period.

7. A telecommunications system according to any preceding claim, each of the transmitters of each group being assigned more than one frame number.
8. A telecommunications system according to any preceding claim, in which each superframe comprises 72 frames.
9. A telecommunications system according to any preceding claim, wherein the transmitters operate asynchronously.
10. A telecommunications system according to any preceding claim, wherein in order to operate at reduced transmission power during the slot or slots assigned to its group in the frame assigned to it, each transmitter is arranged to undergo an idle period.
11. A telecommunications system according to any preceding claim, wherein each transmitter is arranged to operate at reduced transmission power for 0.667ms during the slot or slots assigned to its group in the frame assigned to it.
12. A telecommunications system according to any preceding claim, which is operable according to a W-CDMA system.
13. A telecommunications system according to any preceding claim, wherein the said period is longer than one slot.
14. A telecommunications system according to any preceding claim, substantially as herein described with reference to the accompanying drawings.

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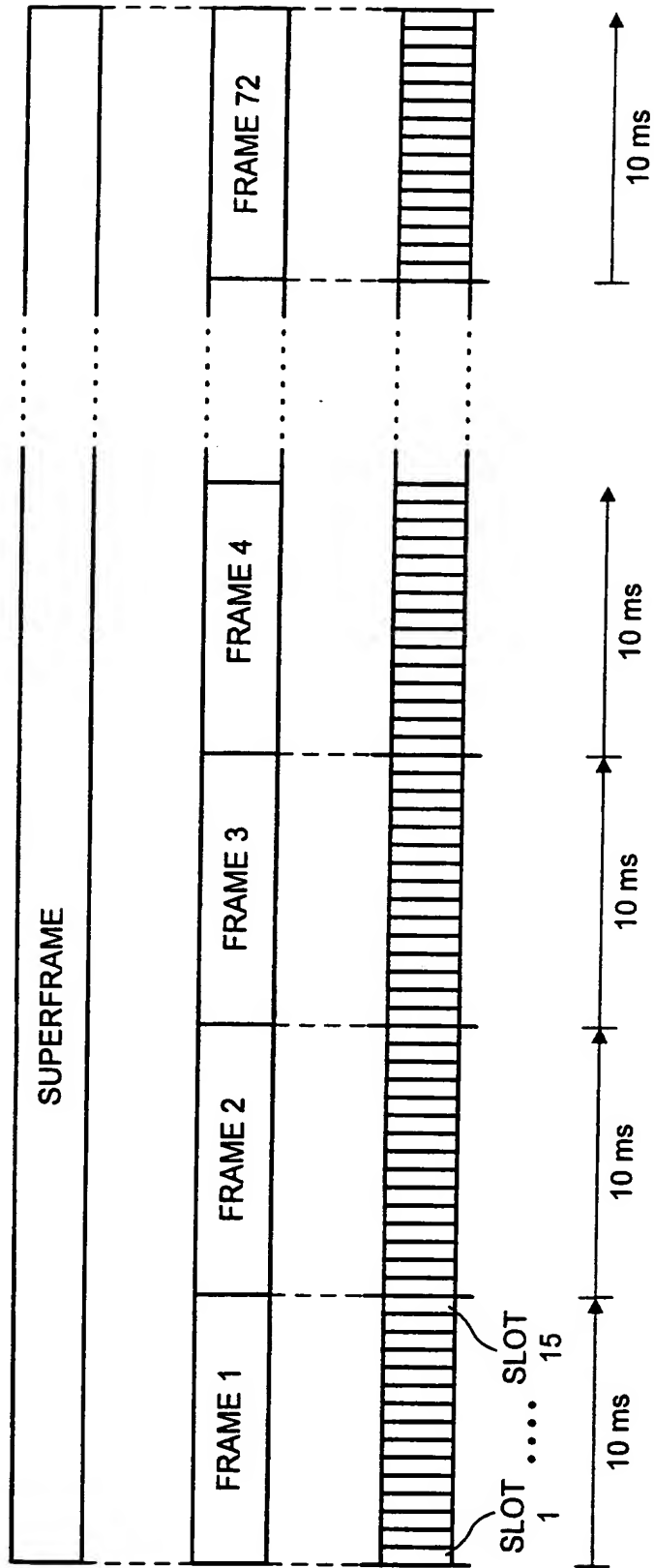


FIG. 1

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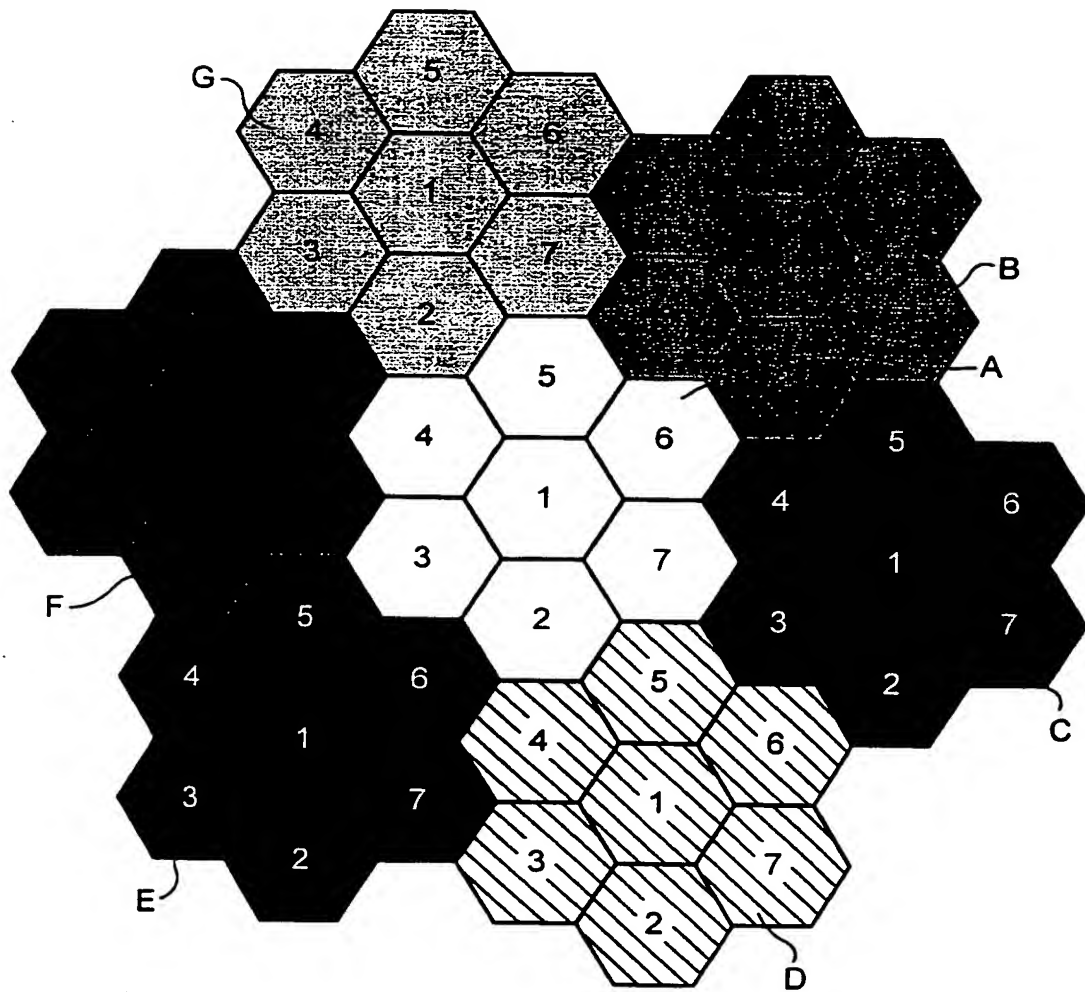


FIG. 2

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